

COMMONWEALTH OF PENNSYLVANIA

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BITUMINOUS COAL RESERVES IN PENNSYLVANIA

By

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Introduction.

The U. S. Geological Survey is publishing as Professional Paper 100, a voluminous report on the coal fields of the United States, which is to be composed of separate parts on each of the coal-producing states. That report will contain estimates of the coal reserves, and in preparation for the chapter on Pennsylvania, Dr. G. H. Ashley requested me to compute the quantity of bituminous coal originally deposited, mined out, and still recoverable in the State.

The work has occupied 9 months, having been begun in November, 1921, and completed in July, 1922.

Earlier Estimate. In 1909, M. R. Campbell\* of the U. S. Geological Survey estimated that the bituminous areas of western Pennsylvania have an extent of 14,200 square miles and contained, when mining first began, 112,574,000,000 short tons. He figured that the supply remaining at the close of 1907 was 109,804,000,000 tons, or 492 times the exhaustion represented by the production of that year.

Present Estimate. To be of real value, an estimate of coal reserves must be based on all available data. In preparing this estimate, facts regarding the extent, thickness, and character of the coal beds were assembled from many sources, and the computation was taken up by counties.

For each county on which a detailed estimate has been prepared, a base map was made for each coal bed by tracing its outcrop from the

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\* U. S. Geological Survey Bulletin 394, p. 23, 1909.



latest maps available. All available measurements of a coal bed were plotted on the map of that coal bed at the locality represented. By studying the distribution of the figures, areas of equal thickness were plotted, and by means of a planimeter, the area of each coal bed in each township was measured. The unit used for calculating the quantity of coal was 90,000 short tons per inch of bed per square mile of area.

Having calculated the quantity of coal originally contained within the area of any bed and subtracted the area already mined out, the writer determined from engineering experience the probable percentage of each bed which could be recovered in different localities. The quantity of coal computed to be in any bed, multiplied by the assumed percentage of recovery, less 15 per cent for loss in mining, gives the estimated recoverable tonnage.

Reports Published. Since January, 1922, the following county reports showing bituminous coal reserves have been published:

Bulletin No.	25	Coal reserves in Greene County, Pennsylvania	
"	"	27 Coal reserves in Washington County	"
"	"	31 Coal reserves in Allegheny County	"
"	"	33 Coal reserves in Fayette County	"
"	"	35 Coal reserves in Westmoreland County	"
"	"	37 Coal reserves in Indiana County	"
"	"	39 Coal reserves in Armstrong County	"
"	"	43 Coal reserves in Somerset County	"
"	"	44 Coal reserves in Cambria County	"
"	"	53 Coal reserves in Clearfield County	"

For the other coal-producing counties shown in the tables but not mentioned above a less detailed estimate was made and separate reports have not been prepared.

Summary Tables. The result of computing the bituminous coal reserves in Pennsylvania is shown in the accompanying tables. One gives the quantity of coal originally deposited, the quantity that has been mined out or made unrecoverable, and the tons that can yet be recovered. The second table shows the estimated recoverable tonnage in each bed by counties.



# Bituminous Coal Reserves in Pennsylvania in Short Tons


County	Original Deposit	Mined Out	Recoverable
Allegheny	3,180,400,000	969,200,000	1,486,900,000
Armstrong	3,750,700,000	107,290,000	2,491,100,000
Beaver	1,116,400,000	1,400,000	560,000,000
Blair	61,900,000	11,900,000	25,000,000
Bradford	39,000,000	300,000	19,000,000
Butler	4,550,000,000	30,000,000	2,300,000,000
Cambria	5,383,000,000	466,900,000	3,638,080,000
Cameron	42,000,000	100,000	20,000,000
Centre	422,000,000	60,000,000	184,000,000
Clarion	1,817,000,000	37,000,000	1,059,000,000
Clearfield	3,992,000,000	308,210,000	2,165,400,000
Clinton	93,000,000	5,000,000	44,000,000
Elk	610,000,000	27,000,000	297,000,000
Fayette	5,229,734,000	899,544,000	2,604,400,000
Greene	10,330,094,000	42,490,000	7,011,400,000
Indiana	6,339,400,000	299,200,000	4,288,700,000
Jefferson	3,420,000,000	180,000,000	1,900,000,000
Lawrence	611,000,000	300,000	311,000,000
Lycoming	68,000,000	200,000	34,000,000
Mercer	363,000,000	40,000,000	172,000,000
McKean	320,700,000	300,000	136,000,000
Somerset	6,091,800,000	187,384,000	3,986,900,000
Tioga	124,400,000	23,200,000	52,000,000
Washington	10,526,023,000	557,763,000	5,481,680,000
Westmoreland	6,381,504,000	1,218,141,000	3,297,500,000
Broad Top Field	391,000,000	46,843,000	265,800,000
Total	75,259,055,000	5,519,665,000	43,830,860,000



Summary of Recoverable Bituminous Coal in Pennsylvania in Short Tons.

County	Washington	Waynesburg	Sewickley	Redstone
Allegheny	-----	-----	-----	79,200,000
Armstrong	-----	-----	-----	-----
Beaver	-----	-----	-----	-----
Blair	-----	-----	-----	-----
Bradford	-----	-----	-----	-----
Butler	-----	-----	-----	-----
Cambria	-----	-----	-----	-----
Cameron	-----	-----	-----	-----
Centre	-----	-----	-----	-----
Clarion	-----	-----	-----	-----
Clearfield	-----	-----	-----	-----
Clinton	-----	-----	-----	-----
Elk	-----	-----	-----	-----
Fayette	-----	199,800,000	123,600,000	75,700,000
Greene	735,148,850	1,647,858,950	1,119,453,950	-----
Indiana	-----	-----	-----	-----
Jefferson	-----	-----	-----	-----
Lawrence	-----	-----	-----	-----
Lycoming	-----	-----	-----	-----
Mercer	-----	-----	-----	-----
McKean	-----	-----	-----	-----
Somerset	-----	-----	3,400,000	5,400,000
Tioga	-----	-----	-----	-----
Washington	212,540,000	668,380,000	-----	88,000,000
Westmoreland	-----	7,600,000	-----	163,200,000
Broad Top Field	-----	-----	-----	-----
Total	947,688,850	2,523,638,950	1,246,453,950	411,500,000





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Summary of Recoverable Bituminous Coal in Pennsylvania  
in Short Tons - Con.

County	Pittsburgh	U.Freeport or "E"	L.Freeport or "D"	D.Kittanning or "C"
Allegheny	280,100,000	1,127,600,000	-----	-----
Armstrong	2,800,000	943,000,000	387,100,000	69,900,000
Beaver	4,000,000	186,000,000	40,000,000	-----
Blair	-----	4,000,000	1,000,000	2,000,000
Bradford	-----	-----	-----	-----
Butler	-----	450,000,000	200,000,000	200,000,000
Cambria	-----	711,920,000	900,730,000	612,430,000
Cameron	-----	-----	-----	-----
Centre	-----	2,000,000	5,000,000	13,000,000
Clarion	-----	9,000,000	16,000,000	30,000,000
Clearfield	-----	234,500,000	537,500,000	224,200,000
Clinton	-----	-----	-----	-----
Elk	-----	3,000,000	8,000,000	-----
Fayette	919,300,000	1,029,000,000	-----	59,000,000
Greene	2,831,453,650	677,484,000	-----	-----
Indiana	21,200,000	1,652,800,000	1,374,800,000	-----
Jefferson	-----	250,000,000	450,000,000	150,000,000
Lawrence	-----	7,000,000	8,000,000	-----
Lycoming	-----	4,000,000	-----	-----
Mercer	-----	-----	-----	-----
McKean	-----	-----	-----	-----
Somerset	16,100,000	525,700,000	219,600,000	2,188,500,000
Tioga	-----	-----	-----	12,000,000
Washington	3,516,860,000	995,900,000	-----	-----
Westmoreland	538,300,000	1,859,200,000	-----	-----
Broad Top Field	-----	46,800,000	-----	-----
Total	8,130,113,650	10,718,904,000	4,147,730,000	3,561,030,000



Summary of Recoverable Bituminous Coal in Pennsylvania  
in Short Tons - Continued

County	M.Kittanning or "C"	L.Kittanning or "B"	Clarion or "A"	Brookville or "A"
Allegheny	-----	-----	-----	-----
Armstrong	-----	1,001,000,000	-----	87,300,000
Beaver	85,000,000	215,000,000	-----	30,000,000
Blair	-----	10,000,000	-----	8,000,000
Bradford	-----	8,000,000	-----	11,000,000
Butler	450,000,000	200,000,000	100,000,000	700,000,000
Cambria	-----	1,348,100,000	21,300,000	43,600,000
Cameron	-----	2,000,000	-----	9,000,000
Centre	6,000,000	50,000,000	-----	108,000,000
Clarion	30,000,000	400,000,000	350,000,000	224,000,000
Clearfield	106,800,000	855,300,000	-----	207,100,000
Clinton	2,000,000	15,000,000	-----	19,000,000
Elk	-----	84,000,000	120,000,000	-----
Fayette	-----	198,000,000	-----	-----
Greene	-----	-----	-----	-----
Indiana	-----	1,239,900,000	-----	-----
Jefferson	220,000,000	430,000,000	-----	400,000,000
Lawrence	90,000,000	90,000,000	-----	96,000,000
Lycoming	10,000,000	20,000,000	-----	-----
Mercer	1,500,000	2,500,000	-----	110,000,000
McKean	-----	300,000	-----	50,000,000
Somerset	-----	910,700,000	54,600,000	62,900,000
Tioga	12,000,000	10,000,000	-----	18,000,000
Washington	-----	-----	-----	-----
Westmoreland	297,500,000	431,700,000	-----	-----
Broad Top Field	-----	94,300,000	124,700,000	-----
Total	1,310,800,000	7,615,800,000	770,600,000	2,183,900,000



Summary of Recoverable Bituminous Coal in Pennsylvania  
in Short Tons - Continued

County	Mercer	Sharon	Total
Allegheny	----	-----	1,486,900,000
Armstrong	----	-----	2,491,100,000
Beaver	----	-----	560,000,000
Blair	----	-----	25,000,000
Bradford	----	-----	19,000,000
Butler	----	-----	2,300,000,000
Cambria	-----	-----	3,638,080,000
Cameron	9,000,000	-----	20,000,000
Centre	----	-----	184,000,000
Clarion	----	-----	1,059,000,000
Clearfield	-----	-----	2,165,400,000
Clinton	8,000,000	-----	44,000,000
Elk	82,000,000	-----	297,000,000
Fayette	----	-----	2,604,400,000
Greene	----	-----	7,011,400,000
Indiana	----	-----	4,288,700,000
Jefferson	-----	-----	1,900,000,000
Lawrence	20,000,000	-----	311,000,000
Lycoming	-----	-----	34,000,000
Mercer	48,000,000	10,000,000	172,000,000
McKean	85,700,000	-----	136,000,000
Somerset	----	-----	3,986,900,000
Tioga	----	-----	52,000,000
Washington	----	-----	5,481,680,000
Westmoreland	----	-----	3,297,500,000
Broad Top Field	----	-----	265,800,000
Total	252,700,000	10,000,000	43,830,860,000



In all the computations of these reserves, the full coal section has been considered as in the original deposit.

This is not always the mineable section, hence the mined out tonnages as shown will seem large for various localities. If only 36 inches of a 42 inch coal bed is being mined, the unmined 6 inches which has been included in the original tonnage of this deposit must be accounted for, As this 6 inches of coal is irrecoverably lost, it has been considered as such, and included in the mined out tonnage.

Coal beds as low as 18 to 24 inches in height in limited areas have been considered as a reserve.

The most readily accessible and best beds have been exploited up to this time, but before long these will be depleted, and the other and less accessible beds will be developed. The geographical location of Pennsylvania with its access to the seaboard marts and the industries of New England will be the great determining factor in the future development of these coals, enabling operators to mine these beds at greater cost per ton but still compete in the same market with the coals of Ohio, West Virginia, and Kentucky. The difference in freight rates will permit this more expensive mining.

Correlation of coal beds. In various counties the coal beds are known by local names, but in this work they have been considered and computed according to the following table:

1. Alton Coal	equivalent to	Mercer
2. Barnett "	"	Lower Kittanning or B
3. Bear Creek coal	"	Brookville or A
4. #1 Berlin "	"	Sewickley
5. Bloss "	"	Lower Kittanning or B
6. B-Rider "	"	Lower Kittanning or B
7. Clairmont Coal	"	Brookville or A
8. Fulton "	"	Clarion or A'
9. Kelly "	"	Upper Freeport or E
10. Morgan "	"	Middle Kittanning or C
11. Platt "	"	Redstone
12. #2 Price "	"	Pittsburgh
13. Seymour "	"	Upper Kittanning or C'

Conclusion. As the area of the bituminous coal fields of Pennsylvania is extremely large, and data for an accurate computation of reserves in a great portion of it are very meagre, it follows that many corrections will be necessary as future exploring and prospecting bring to light new information.

It is respectfully asked and urged that all operators, coal land owners, or any persons who have any information as to the number of coal beds, their thickness, and extent in any portion of the field, submit the same to this Survey. Those who offer criticism and corrections are asked to send the data whereon same is based, and thus enable this Survey to make a more accurate estimate of our coal





reserves. All information thus rendered will be held strictly confidential if the donor so wishes. It is only through such cooperation that a public work can be properly consummated.

If we can compute accurately now the tonnage that remains, it will be a simple matter to determine our reserves at the end of each year as the annual production is recorded and readily available.

As all the information available to the Survey has been used and the greatest care has been exercised in the computations, the figures in the foregoing tables are as accurate as can be made.

The writer wishes to publicly acknowledge his very great indebtedness to Ralph W. Stone, Assistant State Geologist, for thorough editing and constructive criticism of all this series of bulletins.

